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March 30, 1987

Federal Express

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Industrial Site Evaluation Element
New Jersey Department of Environmental Protection
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Trenton, New Jersey 08625

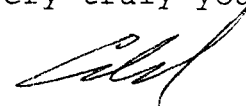
Re: Hexcel Corporation, ECRA Case No. 86009

Dear Mike:

Attached are two letters to you from the Environ Corporation concerning the above-referenced ECRA matter. The first, dated March 25, 1987 describes the investigation of the drainage system at the facility. The second, dated March 27, 1987 concerns the chemical analysis of the oil found in manhole M1, the oil recovery well and the floor drains inside the pit in building number 1.

After you have had a chance to review this information please feel free to contact Robert Powell at Environ. If you have any questions in connection with the ECRA matter in general please contact me.

Very truly yours,


Edward A. Hogan

EAH:hc
Enclosure

cc: Robert L. Powell, Ph.D., P.E.

SDMS Document



88614

ENVIRON Corporation
Counsel in Health and Environmental Science

March 27, 1987

Mr. Michael Nalbone
New Jersey Department of Environmental
Protection
Bureau of Industrial Site Evaluation
Division of Waste Management
401 E. State St., 5th Floor
Trenton, NJ 08625

Re: ECRA Case No. 86009, Fine Organics Corporation Facility,
Lodi, New Jersey

Dear Mr. Nalbone:

In a letter to your department dated December 18, 1986, ENVIRON reported the results of an inspection and dye testing of the industrial sewer system on the Fine Organics Corporation Facility in Lodi, New Jersey (Facility). During the inspection of the sewer system oil was observed to have accumulated on the water surface inside manhole M1 which is located immediately to the rear (west) of Building no. 1. Manhole M1 is believed to be located on and is part of the Passaic Valley Sewer Commission (PVSC) industrial sewer system which crosses the Facility property. On December 30, 1986, ENVIRON removed the oil from manhole M1 by manual bailing and the oil was retained onsite pending completion of chemical tests and a decision regarding its disposal.

A sample of this oil (Sample no. 1) was removed from the manhole for chemical analyses prior to bailing. In addition, oil samples from two other areas of the site were collected at the same time for chemical analyses. These two samples were collected from 1) the oil recovery well adjacent to Molnar Road and the former underground fuel tanks (Sample no. 2) and 2) a floor drain in a pit inside Building no. 1 (Sample no. 3). All three oil samples were shipped by ENVIRON to JTC Environmental Consultants, Inc. (JTC) for chemical analyses.

The purpose of the chemical analyses of the oil samples was to determine the general chemistry of the three oil samples and to compare these samples to determine if they potentially are derived from the same source. The oil samples were analyzed for PCBs, various characteristic metals, and volatile organic compounds. In addition, infrared spectra were prepared for each oil sample to further facilitate a comparison of the dominant hydrocarbon groups. A complete report of these analyses and conclusions from JTC is attached for your information.

The results of these analyses suggest that the oil which was removed from manhole M1 is substantially different from the oils that were removed from the pit inside Building no. 1 and from the oil recovery well. Although all three samples were determined to contain PCBs (aroclor 1242), the concentration in each sample was substantially different. Furthermore the analyses of characteristic metals, volatile organic compounds, and the infrared spectra indicate that the oil in manhole M1 is chemically different than the other two samples. Therefore, we believe it is unlikely that the oil in manhole M1 is from the same source as the oil recovery well or the pit inside Building no. 1. PCB materials are not currently used or stored at the Facility and have not been since December, 1981. Therefore the source of this substantially different PCB contamination is unknown.

An active program has previously been initiated at the Facility to contain and remove oil from the recovery well and the pit inside Building no. 1. Although the oil inside the recovery well has substantially reduced in volume over time, the oil level in the well continues to be monitored, and oil will be removed as necessary. All water which is pumped from the pit inside Building no. 1 is filtered through a diatomaceous earth and activated carbon system to remove any accumulated oil before the water is discharged into the industrial sewer system. The oil is disposed in accordance with applicable regulations by Advanced Environmental Technologies.

At present the source of oil that accumulated in manhole M1 is unknown. ENVIRON will continue to investigate potential sources of this oil by further inspections and testing of onsite drain systems and possibly testing of discharges into the sewer system from offsite. Until such time as the source of this oil can be determined and closed, a program has been initiated to eliminate any offsite release of this oil into the industrial sewer. Specifically manhole M1 is inspected on a weekly interval and any accumulated oil in the manhole will be bailed and stored onsite until it can be disposed in accordance with regulations. Our prior experience in removing the oil from this manhole indicates that oil is accumulating at a rate of approximately 10 to 15 gallons per month. When the manhole was first bailed on December 30, 1986 approximately 75 gallons of oil were removed. Therefore, we believe that a weekly inspection and removal of oil is sufficient at this point to mitigate any release into the PVSC system. If our future inspections indicate that the oil is accumulating at a greater rate we would increase the frequency of inspections and oil removal accordingly. At present manhole M1 is surcharged with water to a point that both the incoming and outgoing pipes are below the normal water level in the manhole. As a result the manhole acts as a natural trap for the oil, which tends to rise to the water surface and, hence, cannot be flushed through the outfall pipe.

886140003

March 27, 1987

In addition we are proposing to immediately implement portions of our proposed sampling plan which we feel may provide some useful information in the evaluation of the potential source(s) of this oil. Specifically we are proposing herein to first construct a soil boring next to manhole M1 and then proceed with boring nos. 1301, 1302, 1201 and 1401 as appropriate. Soil samples would be collected from these borings for chemical testing in accordance with our proposed Sampling Plan which you are now reviewing. We would like to proceed with this work as soon as possible while you continue to review other issues regarding the proposed Sampling Plan.

ENVIRON will continue to vigorously investigate the potential sources of this oil and will take whatever steps are appropriate to mitigate its release into the sewer system. Any new information which we obtain in this regard will be reported to you in a timely manner. If you have any questions on this matter please call.

Very truly yours,



Robert L. Powell, Ph.D., P.E.
Project Manager

RLP:slh
1468H

Attachment

886140004

ENVIRON Corporation
Counsel in Health and Environmental Science

March 25, 1987

Mr. Michael Nalbone
New Jersey Department of Environmental
Protection
Bureau of Industrial Site Evaluation
Division of Waste Management
401 E. State St., 5th Floor
Trenton, NJ 08625

Re: ECRA Case No. 86009
FOI Facility, Lodi, New Jersey

Dear Mr. Nalbone:

Following our earlier submission of information to your department on the drainage and plumbing systems at the FOI Facility in Lodi, New Jersey (Facility), which was contained in a letter dated December 18, 1986, ENVIRON has continued to investigate and research drain systems on the Facility property. Specifically, on February 18, 1987 ENVIRON conducted a further inspection of the storm drain and industrial sewer systems at the Facility and traced their point of outfalls. This inspection was conducted in conjunction with Mr. Ernie Vallarano, an inspector with the Borough of Lodi.

Two major drain systems cross the Facility property as shown on the Drainage System Plan (Plate 2) which is attached. These include a storm drain and an industrial sewer which is part of the Passaic Valley Sewer Commission (PVSC) system. The storm drain system begins to the northeast of the Facility (on the north side of Route 46) at which point it was reported by Mr. Vallarano to enclose an open drainage way known as Lodi Creek. The storm drain enters the Facility along the northeast boundary adjacent to the ramp from Route 46 onto Main Street. The storm drain flows through manholes M7 and M6 in the northeast corner of the property in a 42-inch reinforced concrete pipe (RCP).

From manhole M6 the storm drain flows to the southwest toward Saddle Brook and then to the south parallel to Saddle Brook to manhole M2 in a 48-inch RCP. From manhole M2 the storm drain flows to the south, parallel to Saddle Brook, in a 54-inch corrugated metal pipe (CMP).

From the Facility this storm drain pipe was traced to an outfall into Saddle Brook, approximately 900 feet south of the Facility, and immediately south of the Hendrix wastewater pumping station. At the outfall the storm drain is partially submerged and was observed to be the same 54-inch CMP which exits manhole M2 on the Facility property. No other aboveground evidence of this storm drain (e.g., manholes) was observed between manhole M2 on the Facility property and the outfall to Saddle Brook.

A second drain pipe enters the Facility property along the northeast boundary adjacent to the ramp from Route 46. During the inspection on February 18, 1987 the cover on manhole M8 was removed and water was observed to be running into the manhole from this pipe. Mr. Vallarano reported that the pipe entering manhole M8 from the northeast collects storm water runoff from Main Street and the ramp and interchange with Route 46. During the day of our inspection, however, the weather was quite cold and no substantial runoff was observed along the roadways to be entering storm water catch basins in that area.

Based on current information the source of the water that was observed in this pipe, which enters manhole M8, is unknown, but is believed to be contributed from off-site areas to the northeast of the Facility. Within manhole M8 a large diameter concrete pipe exits to the southwest. Although this pipe is virtually clogged with sediment, the top rim can be observed within the manhole and the pipe is estimated to be approximately a 42 to 48-inch RCP. No water was observed to be discharging into this pipe. Instead, the storm water entering manhole M8 from the northeast discharges through a connecting 24-inch RCP into manhole M6. Once entering manhole M6 this water is combined with the storm water from Lodi Creek and eventually discharges to Saddle Brook. One storm water catch basin at the Facility (CB6) connects to manhole M8, and discharges off-site in the storm water system.

An industrial sewer system is located in the rear of the Facility between the building and Saddle Brook. This sewer is first observed at manhole M4 to the rear of the lab and locker room building. In manhole M4 two pipes are evident. One enters the manhole from the northeast and is a 24-inch RCP. The second pipe exits the manhole to the south and is also a 24-inch RCP. Manhole M4 is partially clogged with sediments and no flow was observed in this manhole. It is unknown whether the 24-inch RCP, which enters manhole M4, connects to the larger diameter RCP which exists manhole M8. However, based on observations during our inspection on February 18, 1987 there is currently no discharge from manhole M8 into manhole M4.

From manhole M4 the 24-inch RCP discharges to the south into manhole M3. Also, several smaller sewer drains from the Facility discharge directly into manhole M3. A small volume of flow was observed to be discharging to the south from manhole M3 into a 36-inch RCP. No flow was observed to be entering manhole M3 from the 24-inch RCP which connects to manhole M4.

From manhole M3 the industrial sewer discharges to a catch basin behind Building no. 1, and subsequently to manhole M1 immediately behind the loading dock at the rear of Building no. 1. From manhole M1 the industrial sewer discharges to the south across Molnar Road. Although we attempted to trace the industrial sewer from Molnar Road to the south, no other above ground evidence of the sewer (e.g., manholes) were observed until the Hendrix pump station. At the pump station the 24-inch RCP industrial sewer is observed to discharge into a wet well and combines with other sanitary sewer lines before being pumped into the PVSC system.

Following our inspection, I contacted Mr. John Takakjian, who is the plant engineer for Napp Chemicals, Inc. The Napp Chemical facility is located on the south side of Molnar Road, adjacent to the FOI Facility. Mr. Takakjian reported to me that the industrial sewer crosses the Napp Chemicals property and continues to flow to the south towards the pump station. He further indicated that a manhole on this sewer is located in the rear yard of the Napp Chemical property, although we were not able to observe this manhole during our inspection. Mr. Takakjian reported that to the best of his knowledge the industrial sewer is continuous from the FOI Facility across the Napp Chemical property to the pump station.

On the FOI Facility property there are two pipe interconnections between the drainage systems. The first interconnection is a 24-inch RCP between manhole M8 and M6 as previously discussed. This interconnection causes the reported storm water flow entering manhole M8 to be diverted into M6 and ultimately to discharge into Saddle Brook.

The second interconnection is between a catch basin in the rear yard of the Facility (behind Building no. 1) into manhole M2. The catch basin is located on and is part of the industrial sewer system. Manhole M2 is part of the storm drain system. During our inspection on March 18, 1987 this interconnecting pipe was observed to be plugged and no flow was discharging from the catch basin into manhole M2. Therefore based on the observed conditions during our inspection there does not at this time appear to be any interconnection between the industrial sewer and storm drainage systems on the

March 25, 1987

property. Furthermore, based on observations and information reported by Mr. Vallarano and Mr. Takakjian, it appears that the industrial sewer is continuous from the Facility property to the Hendrix pump station at which point it discharges to the PVSC system.

In an attempt to document the drainage and sewer systems on the Facility property, a contractor was retained to conduct dye studies of the sewer system. The results of these studies were reported to you in a letter dated December 18, 1986. At the time these studies were conducted, the final outfalls of the storm drain and sewer systems, as described in this letter, were unknown. Hence, these outfalls were not observed for evidence of dye during the earlier tests, which would have documented the continuity of the storm drain and sewer systems. Therefore in order to provide this final documentation, ENVIRON proposes to conduct additional dye tests of the storm drain and industrial sewer systems during which we will monitor the outfalls into Saddle Brook and the Hendrix pump station, respectively. These tests will be conducted as part of the further investigation of the site during implementation of our Sampling Plan.

In addition, to determine the nature of the flow entering the property in the drainage pipe, which enters manhole M8 from the northeast, ENVIRON proposes to collect a water sample from manhole M8 for chemical analysis. This sample will be analyzed for priority pollutant volatile organic compounds and TPHC as general indicators of potential industrial discharges which may be connected to this pipe on other properties to the northeast. In order to provide a basis for comparison of these analyses, a second water sample will be collected from the storm drain at a point upstream of manhole M6. This sample will also be analyzed for TPHC and priority pollutant VOCs. These tests would be conducted as part of the implementation of the sampling plan at the Facility.

If you have any questions regarding the information provided in this letter or comments on our proposed further investigation of the drainage system please call.

Very truly yours,

Robert L. Powell

R.W.B.
Robert L. Powell, Ph.D., P.E.
Project Manager

RLP:slh
Attachment

886140008

JTC DATA REPORT 87-044
Characterization of Oil Samples -
Hexcel Project 536A

Prepared for:
ENVIRON, INCORPORATED
1000 Potomac Street, N.W.
Washington, D.C. 20007

Prepared by:
JTC ENVIRONMENTAL CONSULTANTS, INC.
4 Research Place, Suite L-10
Rockville, Maryland 20850

February 12, 1987

886140009

JTC DATA REPORT 87-044

INTRODUCTION

On January 2, 1987, JTC Environmental Consultants, Inc., (JTC), received three samples from ENVIRON under Project Number 536A, referenced as Hexcel. The three samples were designated as Samples #1, #2, and #3, and were given JTC Laboratory Numbers of 86-0806, 86-0807, and 86-0808 respectively. These samples were originally designated for characterization of three metals, volatile organic compounds, TOX, and PCBs. In follow-up communications with Mr. Robert Powell of ENVIRON, it was decided to modify, and expand the analytical characterization since information was desired on the similarity of these three samples. Specifically, PCB content was to be determined, and characterization of the oil performed to the extent that one could determine if these oils were from identical or different sources.

Additives are an integral part of lubricants. They consist of chemicals used as antiwear agents, antioxidants, rust inhibitors, detergents, and for at least a half a dozen other functions. Many of these additives are metallic salts, where the metal ion is calcium, magnesium, or barium. Typical salts are sulfonates, phenates, phosphonates, dithiophosphates and salicylates. Nonmetallic compounds are also added and consist of polyisobutenyl, succinimides, phosphosulfurized turpenes, aromatic amines, and polyacrylates, to mention a few.

Information provided by ENVIRON indicated that the oils may be a product known as Mobiltherm oil. To obtain information on Mobiltherm oil, JTC contacted Mr. Herman F. Weindel of Mobil Oil Company. Mobiltherm oils are produced for heat transfer operations. Mobiltherm oil is reported to handle high temperatures; 550°F, where normal petroleum oils decompose. Mr. Weindel stated that Mobiltherm oil could also include reclaimed oils. If reclaimed oils are added, these samples may represent mixtures of oil products from various manufacturers. The oil can also contain contaminants as a result of its previous use history prior to processing for use as a heat transfer oil.

Since it was possible that the oils to be characterized consisted of a blend of reclaimed waste oil, it was decided to add volatile organic compounds to the characterization list and expand the metal measurements to include additional metals than the normal oil additives. An investigation of the organic structures was also designated by infrared spectroscopy. Since most oils contain significant amounts of phosphorus and sulfinate additives, it was decided not to characterize these components at this stage of the evaluation.

Methodology

For metal analysis, sample preparation and analytical procedures were conducted according to the EPA Contract Laboratory Program Statement of Work 285, for Inorganic Analysis of Multimedia and High Concentration Materials. In accordance with EPA Contract Laboratory Requirements, JTC performed Quality Control monitoring, which included method blank, method reference sample (Conostan S-21 Metals in Oil), method replicate, and a method spike. For the metal analysis, the method detection limits are concentrations equal to the student t.99 times the standard deviation of 7 separate method blanks. The analysis for volatile organics were performed by GC/MS/DS, and that for PCB by GC according to U. S. Environmental Protection Agency Methods.

Sample #1 was received as a mixture with about twenty percent (20%) water by volume in the sample bottle. Sample #2 contained approximately fifteen percent (15%) water, and Sample #3 contained approximately eighty-five percent (85%) water. The water phase in Sample #3 was blue-green in color. For all analyses reported, it was the oil phase that was analyzed for characterization.

Results

The PCB analyses are presented in Table 1. Analyses were conducted on two dates, January 16th and January 28th of 1987. As Table 1 illustrates, the concentration found on the second analysis was higher for Samples #1 and #3, over that of the first analysis. The variation is a result of heterogeneous nature of these samples, and the presence of possible traces of water in sample volumes removed for analysis. As a result of the variation, an average value should be utilized as most representable of the PCB content. For all oil samples, the PCB was characterized as Arochlor 1242.

Results for the metals characterization are presented in Table 2. For many oils, calcium, magnesium, zinc, and barium are typical additives and would be expected to be found in most oil samples. What is unique with the oils analyzed here, is that Sample #1 contained no zinc at the detection level, whereas Samples #2 and #3 contained approximately the same amount of zinc. Several other significant differences exist. Cadmium and copper are present at significant levels in Sample #2 and #3, but absent in Sample #1. Based upon the metal composition, Sample #1 appears distinctly different from Samples #2 and #3. Samples #2 and #3 are not identical. Chemical differences include the presence of nickel in Sample #2, but its absence in Sample #3, and a significantly greater quantity of calcium in Sample #2 than Sample #3.

Based upon a review of the metals data, Oil Sample #1 is of a different source or has a significantly different history than Samples #2 and #3. This conclusion is based on the fact that a number of the metals could not be found in Sample #1 that were found in Samples #2 and #3.

The results for volatile organic compounds are presented in Tables 3 and 4. The volatile organic chemicals are reported in units of milligrams per liter (mg/l). As a result of this high concentration, it was necessary to analyze dilutions, resulting in detection limits that are higher than typically reported for water. Volatile organic compounds that are frequently found in oils are benzene, ethylbenzene, toluene, 1,1,1-trichloroethylene, and xylenes. The volatile compounds illustrate several significant differences between these oils (Table 3). Oil Sample #1 contained 16,000 milligrams per liter of tetrachloroethylene. This level is significantly greater than that which would be picked up from site exposure, or contaminated waters. This compound is a major component of this oil mixture.

Tentatively identified volatile organic compounds are presented in Table 4. Oil Sample #1 contains a substituted cyclopentane of nine carbons. This compound is not present in Samples #2 and #3. Substitutions are referred as methyl or ethyl type structures. Sample #1 also contains propylbenzene, which isn't present in Samples #2 and #3. Samples #2 and #3 contain trimethylcyclohexane, which is absent in Sample #1. Sample #3 does not contain a substituted cyclohexane at scan number 838 or the cyclic hydrocarbon at scan number 871, these compounds are present in Sample #1. Based upon the volatile organic compounds, there appears to be some minor differences between Oils Samples #2 and #3, and significant differences when these two oils are compared to Sample #1.

The infrared spectra for each oil sample is presented in Figures 1 through 5. Figure 1 shows the spectra for Sample #1 and Figure 2 shows an enhanced version of that spectra to bring out more details in the frequency of 1200 to 600 cm^{-1} . Figure 3 and 4 present the spectra for Sample #2, with Figure 4 providing an enhancement of the spectra for the range of 1200 to 700 cm^{-1} . Figure 5 presents the spectra for Oil Sample #3.

The frequency for 1200 to 700 cm^{-1} was enhanced in Figures 2 and 4 by increasing the amount of the sample subject to the infrared beam. These frequency regions are important in determining whether samples are chemically identical, and many times provide the fingerprint for distinguishing identical samples. In this region, the vibrational and rotational energy changes of molecules within the samples, as a whole, are quite characteristic for particular molecules.

The broad spectral response and the frequency band at 3500 cm^{-1} for Sample #1 and #3, are a result of the O-H bonding in water. As mentioned previously, these samples did contain a mixture of oil and water. In the frequency range of 2880 to 3000 cm^{-1} , the samples show the characteristic C-H bond of alkanes. An inspection of Figures 3 and 5 illustrate that Oil Samples #2 and #3 are essentially identical within this frequency range. Sample #1 shows a significant difference in the absorptive response of this frequency range (Figure 1). The absorptive response for Sample #1 is basically a reverse pattern to that of Figures 3 and 5. The presence of the cyclopentane at GC/MS scan 706, and absence of trimethylcyclohexane (Table 4) may account for this difference. However, there are probably larger chain carbon compounds that are making a significant difference that the GC/MS is not detecting. At the frequency range of 1620 cm^{-1} , the typical pattern for double bonded carbons in alkene structures are found. The intensity and position of this frequency band varies recognizably with the structure of the alkene. It varies with the degree of branching at the double bond, and with the presence of second unsaturated groups in conjunction with the first. An inspection of Figures 2, 4, and 5 illustrate significant differences in the shape and position of this band. An observation of each spectra also illustrates absorptions near 1,480 cm^{-1} . These are due to hydrogen bond vibrations, probably associated with alkene compounds. The two absorption bands near 1600 cm^{-1} and 1500 cm^{-1} in each spectra for Oil #1 and #2 (Figures 2 and 4), illustrate features common of benzene derivatives. This pattern is not nearly as pronounced for Oil Sample #3 (Figure 5). For Oil Samples #1 and #2, the spectra between 1650 to 2000 cm^{-1} , 1225 to 950 cm^{-1} , and below 900 cm^{-1} correlate with the number and positions of range

substitutions. The fact that these absorption bands are much weaker in Oil Sample #3, correlates well with the volatile organic content illustrated in Tables 3 and 4. The benzene derivative compounds are approximately 3 times higher in Oil Sample #1 than Oil Sample #3.

The absorption band at 1380 to 1490 is essentially identical for Sample #2 and #3 (Figures 3 and 5). On the other hand, the absorption band at this frequency for Sample #1 (Figure 2), shows a significant difference in the chemical structure. In the key fingerprinting range of 1200 to 600 cm^{-1} , it is clear that Oil Samples #2 and #3 are significantly different from Oil Sample #1. The absorption bands at 790, 820, and 920 cm^{-1} (Figure 2), are clearly a result of tetrachloroethylene in Sample #1. These bands are not present in Samples #2 and #3, confirming the GC/MS spectra.

Conclusion

The three oil samples submitted for evaluation have the same Arochlor 1242 present in a concentration of 60 to 1085 $\mu\text{g/g}$. The characterization analyses provide preliminary evidence that neither oil is identical, but Oil Samples #2 and #3 are more closely aligned than either of these two oils are to Oil Sample #1. This conclusion is based on preliminary characterizations, since it is believed that additional evaluations can provide confirmation of this conclusion.

Recommendations

It is recommended that additional testing be performed, so that the conclusion that Oil Sample #1 is significantly different can be confirmed. A quantitative intensity study of the IR spectra for these samples are recommended. This evaluation would control the oil film thickness exposed to the IR beam and allow the spectra to be quantitatively compared. It is also recommended that the IR spectra be extended to the frequency range of 200 cm^{-1} . The reason for this recommendation is that it is felt that Oil Sample #1 is significantly different than the other two samples, and an infrared scan with greater sensitivity and resolution down to the 200 cm^{-1} frequency range would provide stronger support of this difference. It is suggested that this be coupled with nuclear magnetic resonance spectroscopy, which could provide confirmation of these differences. A significant component of these oil samples probably consist of carbon chains over 20 atoms, and NMR evaluations that would prove more appropriate than GC/MS evaluations.

TABLE 1

COMPARISON OF PCB CONTENT IN OILS

ANALYSIS DATE	SAMPLE DESIGNATION CONCENTRATION $\mu\text{g/g}$		
	#1 MANHole M1 85-0806	#2 Recovery 86-0807 well	#3 Floor drain 86-0808
1/16/87	620	60	820
1/28/87	900	60	1350
AVERAGE	760	60	1085

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TABLE 2
COMPARISON OF METALS CONTENT IN OILS

PARAMETER	DETECTION LIMIT*	SAMPLE DESIGNATION CONCENTRATION mg/kg		
		<i>MMH₂le M¹</i> #1 36-0806	#2 <i>recovery well</i> 86-0807	#3 <i>Fluor 3-1</i> 86-0808
Ca	456	440	2140	860
Mg	40	103	87	99
Zn	23	BDL	104	118
Ba	62	BDL	38	30
Be	9	BDL	BDL	BDL
Cd	9	BDL	20	22
Cr	19	BDL	BDL	BDL
Cu	32	BDL	174	179
Pb	23	BDL	24	52
Ni	36	BDL	78	BDL
Ag	31	BDL	BDL	BDL
Tl	94	BDL	110	102

*Determined mean detection limit.
BDL = Below Detection Limit.

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TABLE 3
COMPARISON OF VOLATILE ORGANIC CONTENT IN OILS

COMPOUND	SAMPLE DESIGNATION CONCENTRATION mg/L		
	#1 86-086	#2 86-0807	#3 86-0808
Benzene	BDL*	25	BDL
Chlorobenzene	140	240	BDL
Ethylbenzene	130	100	80
Methylene chloride	BDL	BDL	3640
Tetrachloroethylene	16,000	540	3460
Toluene	280	100	110
1,2-trans-dichloroethylene	BDL	1600	BDL
1,1,1-trichloroethane	310	BDL	51
Trichloroethylene	970	190	BDL
2-butanone	BDL	290	BDL
Xylenes	1060	620	420

*BDL = Below Detection Limit. As a result of the high concentration of volatile organics in these oil samples, it was necessary to dilute the sample. Therefore the detection limit is higher than that normally reported for water samples.

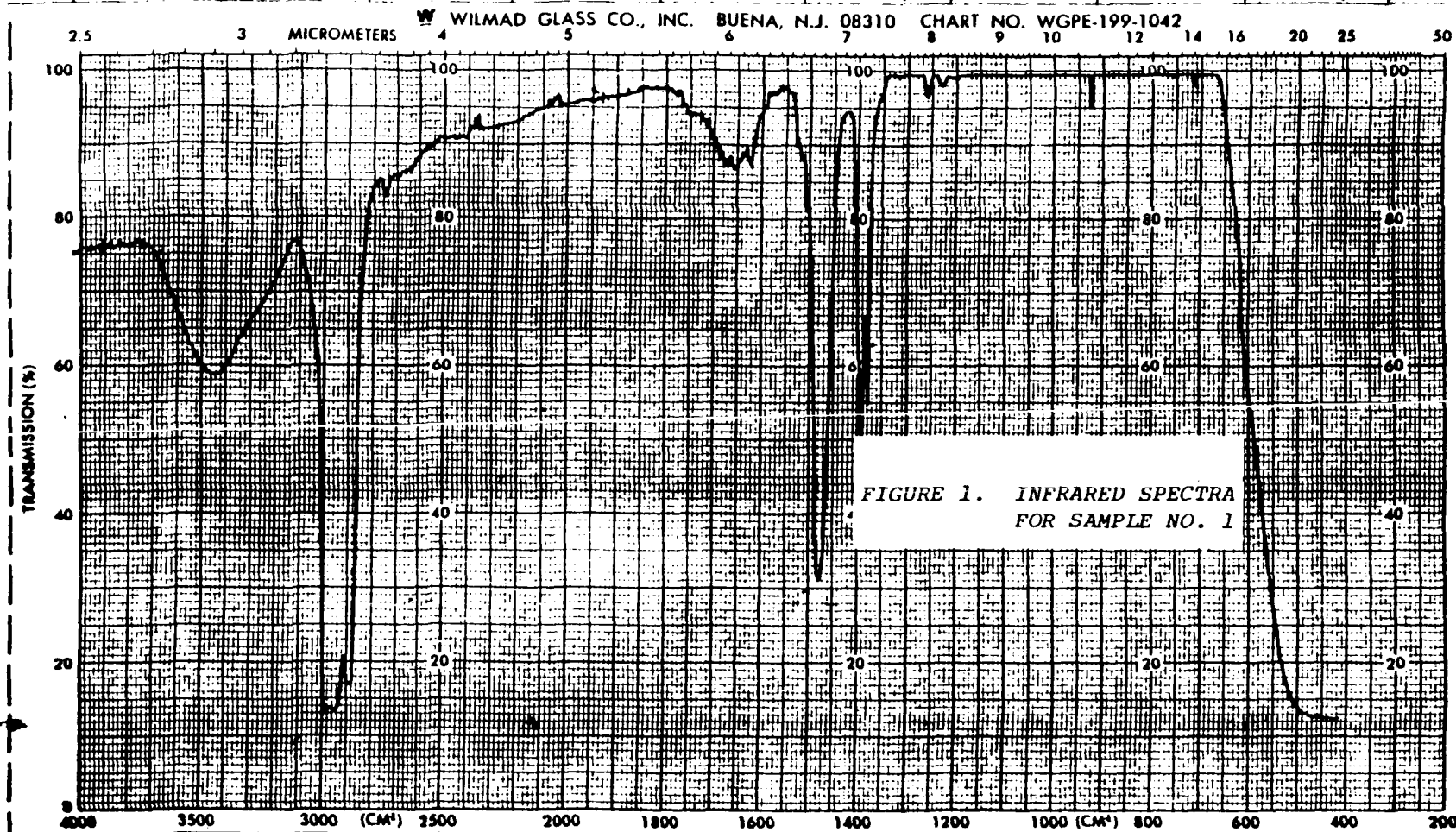
TABLE 4
TENTATIVELY IDENTIFIED VOLATILE ORGANICS

Scan No.	Compound Name	Formula	PRESENT IN SAMPLE		
			#1 86-0806	#2 86-0807	#3 86-0808
706	Substituted Cyclopentane	C_9H_{16}	Y	N	N
775	Trimethylcyclohexane	C_9H_{18}	N	Y	Y
782	Octahydromethylpentalene	C_9H_{16}	Y	Y	Y
815	Ethylmethylcyclohexane	C_9H_{16}	Y	Y	Y
838	Substituted Cyclohexane	C_9H_{18}	Y	Y	N
871	Substituted Cyclohydrocarbon	$C_{10}H_{20}$	Y	Y	N
895	Substituted Cyclohexane	C_9H_{18}	Y	Y	Y
949	Dimethyloctene	$C_{10}H_{20}$	Y	Y	Y
963	Propylbenzene	C_9H_{12}	Y	N	N

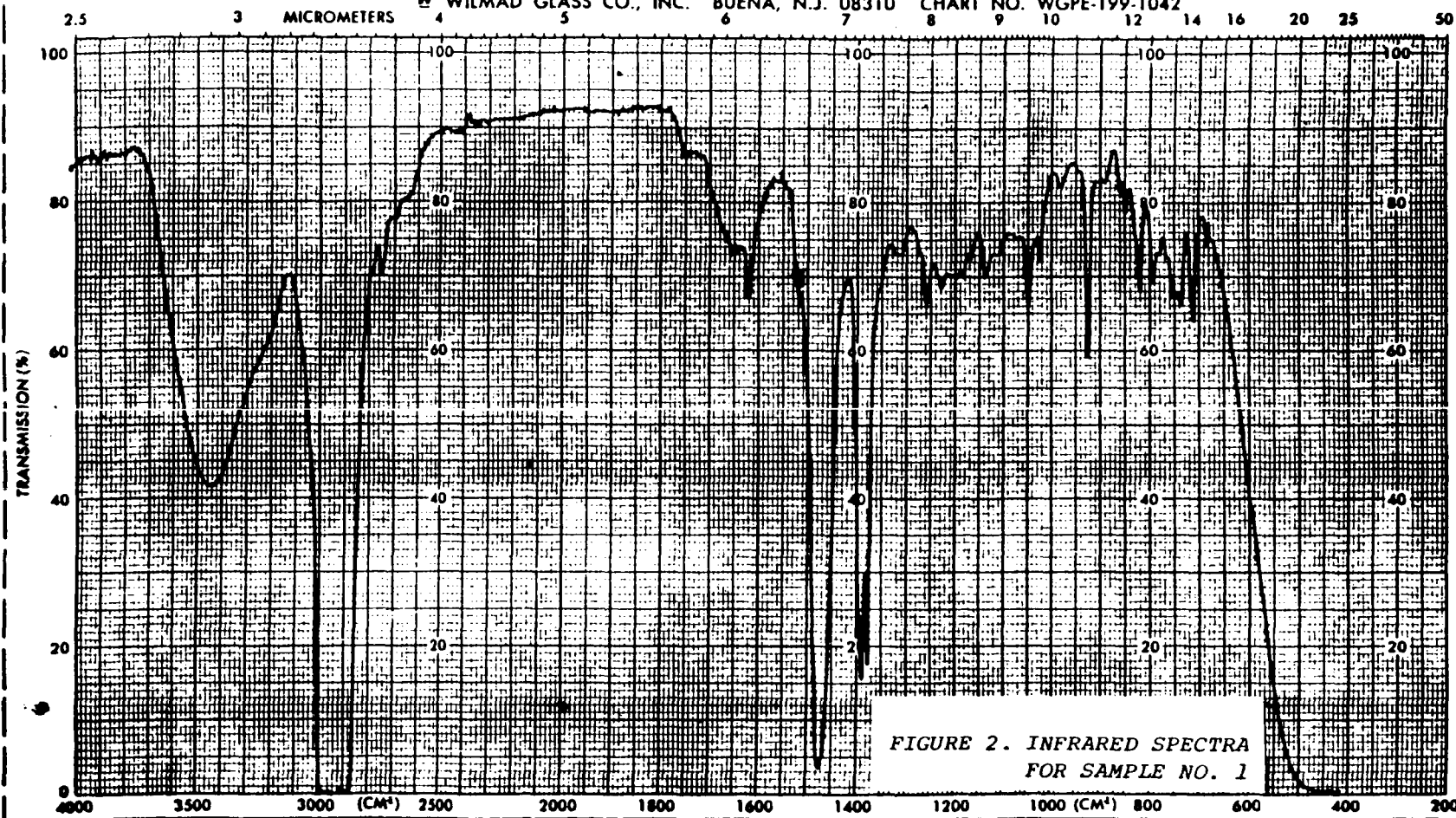
Y = Yes, compound is present.

N = No, compound is not present.

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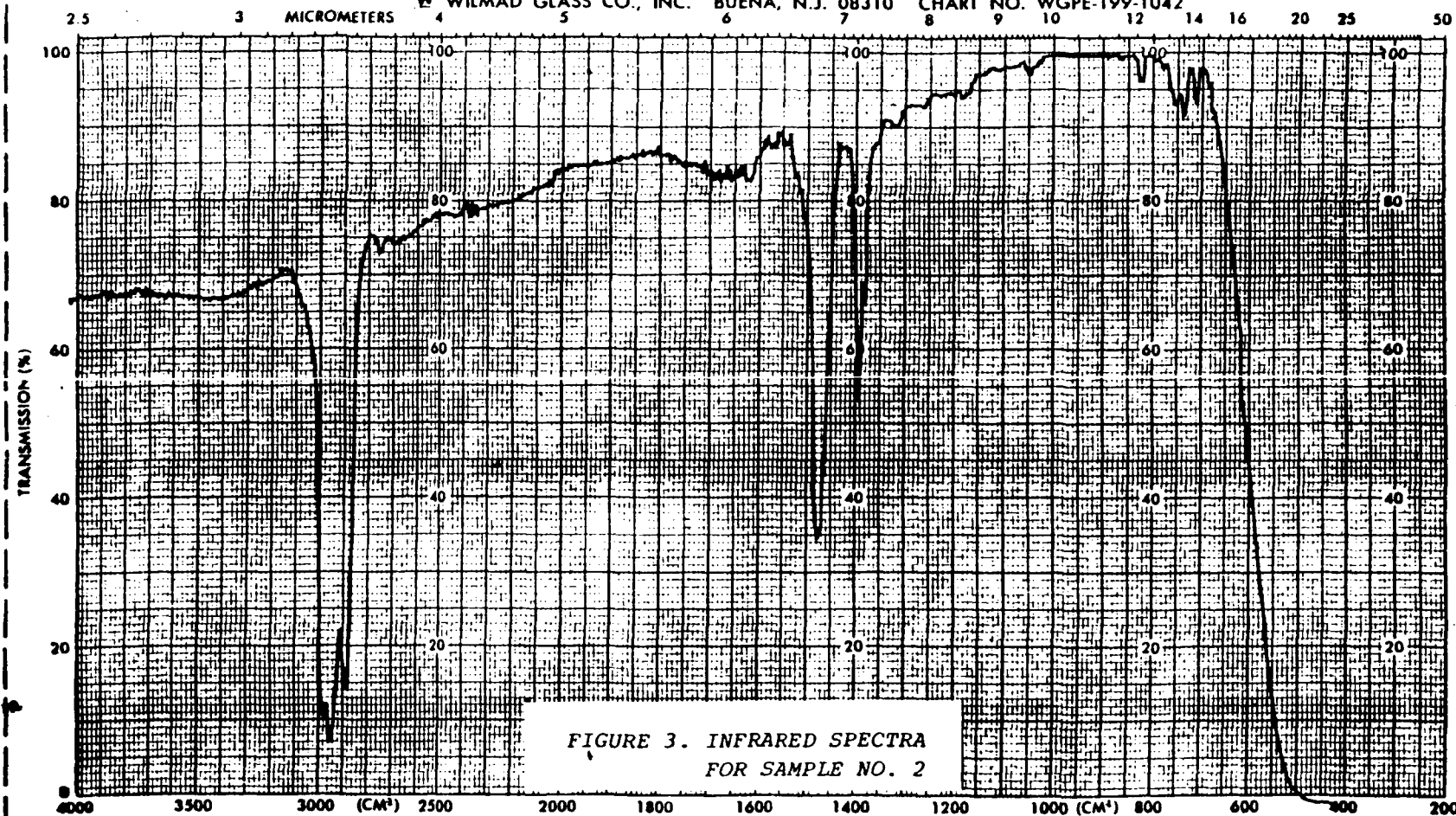


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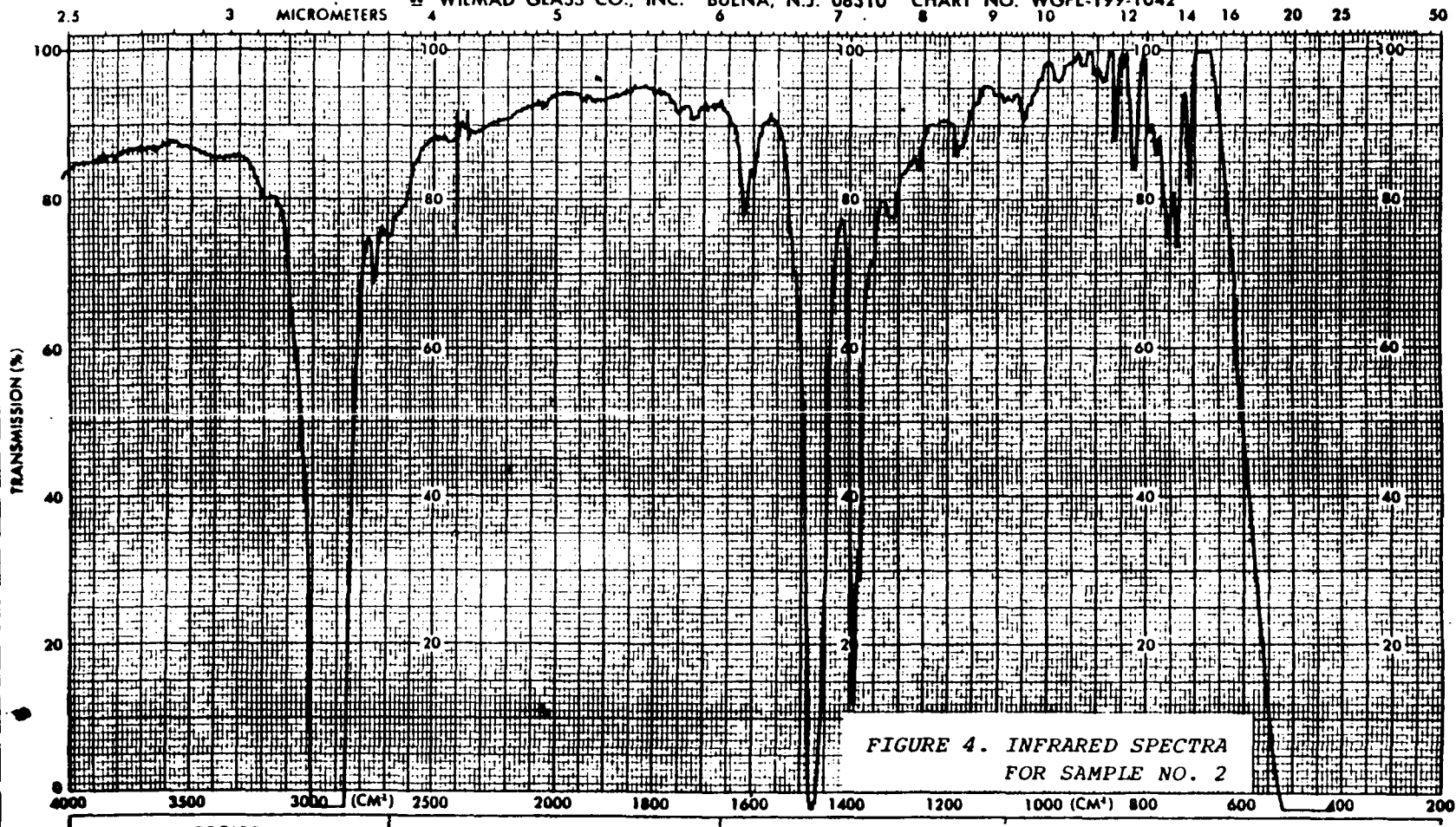


SAMPLE

REF. NO.

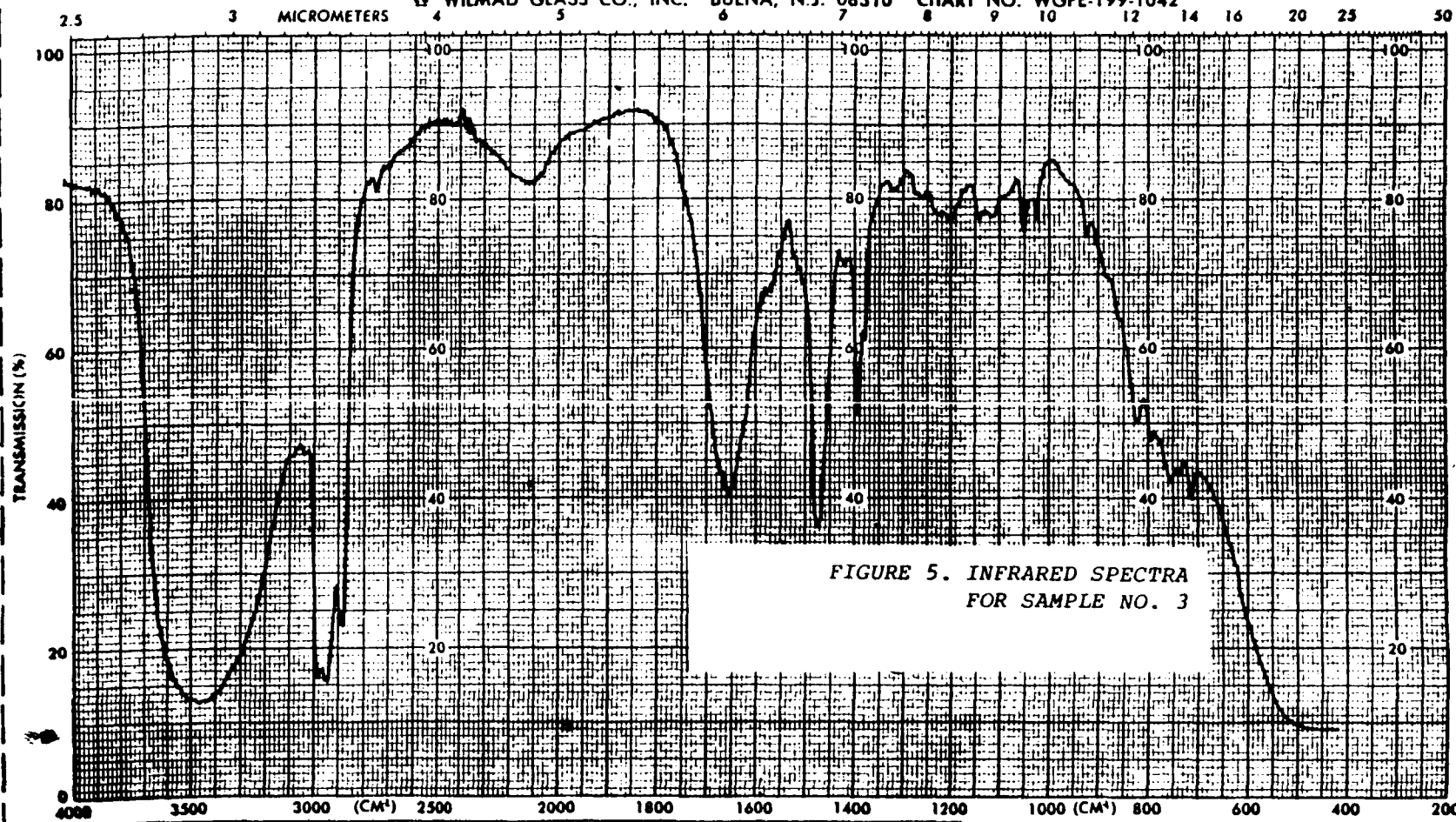
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SAMPLE

REF. NO.

886140023